8/6/08-00717

Responses to Comments
Draft Expanded Remedial Investigation Report
Site 2
St. Juliens Creek Annex
Chesapeake, Virginia

PREPARED FOR: Tim Reisch, NAVFAC Mid-Atlantic
Walt Bell, NAVFAC Mid-Atlantic

PREPARED BY: CH2M HILL

DATE: August 6, 2008

Comments from NMCPHC, provided 17 June 08.

1. *Comment:* This report relies on the U.S. Environmental Protection Agency (USEPA) Region 3 risk-based concentrations (RBCs) to identify constituents of potential concern (COPCs) for the baseline human health risk assessment (HHRA). Effective Spring 2008, the USEPA Region 3 RBC table was replaced by the Regional Screening Table (RST) developed by Oak Ridge National Laboratory for the USEPA (available online at: http://epa-prgs.ornl.gov/chemicals/index.shtml). In many cases, the soil screening levels (SLs) on the RST are more conservative than the Region 3 soil RBCs since the RST includes exposure pathways that were not used by Region 3 (i.e., dermal contact and inhalation). As such, if the new SLs are used, some additional COPCs would be identified in the baseline HHRA.
We recommend comparing the RST SLs to the Region 3 RBCs that were used in this report to identify the potential impact that using the new SLs would have on COPC identification and subsequent risk assessment calculations. If the use of the new SLs would not impact the HHRA risk characterization and conclusions, we recommend documenting this in the HHRA. However, if the results of this analysis suggest that the conclusions drawn from the risk characterization could change based on the addition of new COPCs, it may be appropriate to update the HHRA with these new screening levels before finalizing the report.

   Response: The draft expanded RI was completed before the release of the RST. The final HHRA will be updated to use the RST SLs.

2. *Comment:* The trichloroethylene (TCE) toxicity values used in this HHRA are not consistent with the draft agreement reached between USEPA and the U.S. Department of Defense (DOD). This draft agreement is based on DOD's endorsement (reference [a]) of the USEPA's updated hierarchy of sources for human health toxicity values (reference [b]). Based on ref (a), we recommend using the California Environmental Protection Agency (Cal-EPA) inhalation unit

risk value of 2.0E-6 (ug/m3)-1 per ref (c) and Cal-EPA's oral cancer slope factor (CSF) of 0.013 (mg/kg-day)-1 ref (d) for both the COPC screening and risk calculations.

Response: The risk assessment in the draft report was performed before the agreement between DOD and USEPA was recognized. The final risk assessment will be updated using the Cal-EPA toxicity values for TCE.

3. *Comment:* Section 5.1.5 of the report states that the results of the subsurface soil investigation "indicate a strong likelihood of DNAPL contamination." Section 5.1.6 states that, "The maximum TCE concentration in Columbia aquifer monitoring wells (330,000 ug/L) is approximately 30 percent of the TCE solubility level (11,000 ug/L), indicating the likely presence of DNAPL." In comparison, other sections of this report (e.g., Sections 5.1.5 and 10) state that the nature and extent of contamination has been adequately characterized. Since there is a "strong likelihood of DNAPL contamination" at this site which has not been confirmed, it seems premature to state that the nature and extent of contamination has been adequately characterized. We recommend either clarifying the statements about DNAPL or about the nature and extent throughout the report.

   Response: The TCE plume has been sufficiently delineated. Because DNAPL presence is difficult to confirm, indirect evidence and "rules of thumb" are used (refer to *Site Characterization and Technologies for DNAPL Investigations*, USEPA September 2004), as reflected in the report. Based on the "rules of thumb" it is assumed that DNAPL is present, which will be clarified in the final report.

4. *Comment:* Section 7.2.2 of the HHRA lists vapor intrusion from groundwater to indoor air as a potentially complete exposure pathway. However, neither the text nor the tables in Section 7 contain any sort of qualitative or quantitative evaluation of this pathway. The reader does not learn that this pathway was not evaluated until they look at Appendix M, Table 1. The complete omission of any discussion about this pathway in the baseline HHRA is a fairly significant shortcoming, particularly considering the potential presence of dense non-aqueous phase liquids (DNAPL) at Site 2. Based on the risk characterization for future residents in contact with groundwater, we concur that a quantitative evaluation of this pathway would not change the HHRA conclusions. However, we recommend that the baseline HHRA be updated to include a qualitative discussion of this pathway, including an explanation of why this pathway was not quantitatively evaluated.

   Response: The final HHRA will be updated to include a qualitative discussion of the vapor intrusion pathway and why it was not quantitatively evaluated.

5. *Comment:* The nature and extent section of the report concludes that DNAPL is likely present at Site 2. Although the nature and extent of possible DNAPL has not been delineated in this report, it is unlikely that it is present across the entire 4 acre site based on a review of Figures 5-11, 5-14, and 5-15.

We recommend reviewing the nature and extent data to determine if it would be appropriate to perform a "hot spot" analysis for this site. The HHRA combined data across the entire 4-acre site into one dataset to develop the exposure point concentrations (EPCs). Due to the size of the site, it is unlikely that the receptors evaluated in the HHRA would have contact with all parts of the site at the same rate. As such, when risks were calculated at potentially unacceptable levels, this suggests a remedial action may be warranted at the entire site, which may not actually be case if the risk is driven by exposure to the lone area of higher contamination.

Response: Assessment of risk associated with soil included site-wide data because the waste disposal activities took place across the site and there are no significant differences in concentrations. Risk in groundwater is limited to the delineated plume; therefore, remedial action will also be limited to that area.

6. ***Comment:*** A thorough quality assurance/quality control (QA/QC) review of the intake and risk calculations was not performed, in part because of the specific comments below that would impact the calculation results. Also, Tables 7.1.RME to 7.7.RME in Appendix M were missing from our hard copy, which made it difficult to confirm the intakes.

   However, during a cursory review of the calculation tables in Appendix M, we noticed on Table 9.1.RME M that the current/future adult trespasser had a higher cancer risk from contact with benzo(b)fluoranthene in sediment than from benzo(a)pyrene. Since benzo(a)pyrene has a higher EPC (per Table 3.4.RME in Appendix M) and a higher cancer slope factor (CSF), there must be an error on this table. We also noticed this table reports the carcinogenic risk from exposure to vinyl chloride in sediment as zero, which is also an error. We recommend that a thorough QA/QC be conducted of the calculations before this report is finalized.

   Response: The links between the Table 7s and 9s in Appendix M were changed during production of the report, resulting in the errors described above. A thorough QA/QC of the risk calculations will be performed and any errors corrected prior to submittal of the final report.

7. ***Comment:*** The Executive Summary is missing sufficient detail to provide the entire "picture", making it necessary to review the body of the report for missing information. For example, it would be helpful if the Site Description and History section included a figure that clearly depicts where the different buildings and other identified features are located within Site 2. Without a visual depiction of the layout it is difficult to follow the text.

   In other cases, information in the Executive Summary is edited to the point where it is inaccurate, or presents a misleading picture. For example, on page xi it is misleading to state "There are no non-carcinogenic hazards or carcinogenic risks…" It should be stated that the hazard indices and carcinogenic risks are below benchmark levels (e.g., less than a1.0E-06 cancer risk). We recommend

updating the Executive Summary so it can be a stand-alone section that provides sufficient and accurate information about the site, the investigation, and the report conclusions.

Response: References to appropriate figures in the text will be added to the Executive Summary in order to provide a more complete understanding of the site. Additionally, the Executive Summary will be reviewed and any inaccuracies will be corrected.

8. ***Comment: Page 5-4. Section 5.1.5 Subsurface Soil Sampling***

a. The first sentence in this section states, "*Subsurface soil samples collected during the Site 2 RI adequately defined the nature and extent of subsurface soil contamination.*"
Per General Comment 3, the rest of this section concludes that DNAPL may be present, although it wasn't specifically observed during the sampling. Since there is a "*strong likelihood of DNAPL contamination*" at this site that hasn't been confirmed, it seems premature to state that the nature and extent of contamination has been adequately characterized.

b. This section does not present the results of the dioxon/furan analyses that were performed. We recommend including this information in this section.

Response: With regards to DNAPL, see Response to Comment 3. The results of the soil dioxin/furan analyses will be added under Section 5.1.5.

9. ***Comment:*** Page 5-13. Section 5.2 Sources of Contamination

The first sentence of the second paragraph in this section states, "*Constituents in surface and subsurface soil reflective of potential impacts from Site 2 are inorganics, PAHs, pesticides, and dioxin.*"

It is unclear why CVOCs are not included in this list. Since Section 5.1.5 of this report concludes that CVOCs may be present as DNAPL in saturated soils, we recommend explaining why CVOCs are not discussed in this section.

Response: DNAPL in saturated soils is being treated as contamination in the shallow groundwater, which will be clarified in the report.

10. ***Comment:*** Table 5-1. Surface Soil Detections and Exceedances of Screening Criteria.

There are several "NA" entries on this table which do not make sense. For example, the 4,4-DDT result for sample SJS02-SS03-00 is reported as "NA" which means not analyzed according to the footnotes. However, since there are other pesticide results for this sample, including 4,4-DDD and 4,4-DDE, it is counterintuitive that this sample was not analyzed for the presence of 4,4-DDT. We recommend reviewing the information on this table to ensure it is correct and that all rejected results are shown.

Response: The "NA" designations in Table 5-1 are results for older samples collected by a different contractor; therefore, the raw analytical data is unavailable. The "NA" designations shown on Table 5-1 are based on data from the previous contractor which have been loaded into the database.

11. ***Comment:*** Page 6-9. Section 6.2 Contaminant Transport. Unsaturated Zone Migration.

    The first paragraph of this section states, "*Volatilization of VOCs into soil gas or even the atmosphere in surface soil can occur in the unsaturated zone; although this is considered a minor transport pathway.*"

    We recommend adding text to this section that supports the conclusion in the above sentence.

    Response: Since VOCs in unsaturated soil are present at relatively low concentrations and are not identified as risk drivers, their volatilization is not considered a major component of contaminant migration in the unsaturated zone. However, it is a valid pathway. Additional text will be added to clarify this statement.

12. ***Comment:*** Page 6-11. Section 6.3 Fate and Transport Modeling Assessment
    Page 6-12. Section 6.4 Summary of Current Migration Pathways
    These sections do not include a discussion of the potential transport of VOC vapors from subsurface to the surface. The combination of the constituent concentrations in groundwater, the short distance between the shallow groundwater aquifer water table and ground surface and the soil composition indicate that vapor intrusion could potentially be an important exposure pathway. We recommend updating these sections to include an evaluation of this pathway so this chapter provides a more complete evaluation of all possible migration/transport pathways that are evaluated (even qualitatively) in the HHRA.

    Response: The objective of the fate and transport model was to assess the current stability of the plume and relative remediation timeframes. The loss of CVOCs to the vapor migration pathway is assumed to be minor compared to the advection, dispersion, sorption, and degradation components and is not included as a component in the model software. However, a statement will be added to this section acknowledging the presence of this pathway and its potential impacts on the model results. In general, not including this pathway in the model should result in more conservative estimates. Because there is no loss of contaminant mass to the vapor pathway, the plume would potentially migrate further or take longer to stabilize. The groundwater vapor migration to the atmosphere transport pathway will be added to Section 6.4.

13. ***Comment: Figure 6-1. Site 2 Conceptual Site Model***
    The conceptual site model does not include the inhalation of vapors pathway for future industrial workers and residents due to potential vapor intrusion. We

recommend updating this figure so this potentially complete exposure pathway is included.

Response: Figure 6-1 will be updated to show the potential inhalation of vapors pathway for future industrial workers and residents.

14. ***Comment:*** Page 7-4. Section 7.1.2 Selection of Chemicals of Potential Concern, 2nd bullet
Page 7-4. Section 7.1.2 Selection of Chemicals of Potential Concern, 3rd bullet
Both of these bullets incorrectly state that the RBCs based on carcinogenic effects were used as presented in the RBC table. As stated earlier in this section, the RBCs were multiplied by ten; since the RBCs based on noncarcinogenic endpoints were adjusted to account for a target hazard index (HI) of 0.1, these are the screening values that were used as shown on the Region 3 RBC table. We recommend editing this text as appropriate.

Response: The HHRA will be updated to use the RST SLs.

15. ***Comment:*** Page 7-4. Section 7.1.2 Selection of Chemicals of Potential Concern, 4th bullet
Editorial: The last sentence should reference Appendix M instead of Appendix L.

Response: The suggested change will be made.

16. ***Comment:*** Page 7-9. Section 7.2.2 Identification of Exposure Pathways, Future Exposure Routes

a. It is unclear why the vapor intrusion pathway is listed separately from the other exposure pathways listed for the future residents. Since this is the same receptor, we recommend deleting the second bullet on this page and including the vapor intrusion pathway with the first two bullets for the future residents.

b. The vapor intrusion pathway is potentially complete for the future industrial worker. We recommend including this pathway in the last bullet in this section.

c. Consistent with General Comment #4, we recommend adding text to this section that discusses the vapor intrusion pathway.

Response: The suggested changes will be made.

17. ***Comment:*** Page 7-11. Section 7.3.1 Toxicity Information for Non-carcinogenic Effects

The last paragraph, second sentence states, "*USEPA's NCEA develops subchronic RfDs...*" There are other sources of subchronic RfDs such as EPA's Provisional Peer-Reviewed Toxicity Value (PPRTV) database and ref (e). We recommend including these additional sources in this sentence.

Response: Reference to NCEA (and additional sources of subchronic RfDs) will be eliminated from sentence. The following text will be stated "Subchronic RfDs are developed for short term exposure....."

18. ***Comment:*** Page 7-12. Section 7.3.1 Toxicity Information for Non-carcinogenic Effects

    The second paragraph states, "*These UFs and MFs range between **10** and 10,000 and are based on professional judgment*" (emphasis added). The range of uncertainty factors (UFs) and modifying factors (MFs) that USEPA may assign when developing reference doses (RfDs) is actually between 1 and 10,000 (e.g., the oral RfD for manganese). We recommend replacing "10" with "1" in the sentence above.

    Response: The suggested change will be made.

19. ***Comment:*** Page 7-12. Section 7.3.2 Toxicity Information for Carcinogenic Effects

    This section presents a description of the weight-of-evidence classification based on the USEPA's previous guidance. The carcinogen classification should be updated with the classification scheme presented in USEPA's current guidelines (reference [k]).

    Response: The suggested update will be made. As the weight-of-evidence classification is still used for chemicals that have not been updated recently, both classification schemes will be presented in the text. The paragraph will be changed to the following:
    "In addition to deriving a quantitative estimate of carcinogenic potency, USEPA also presents the weight of evidence of potential carcinogens. Current USEPA guidance (USEPA, 2005) uses a narrative approach to assess weight of evidence with five standard hazard descriptors:": "*Carcinogenic to Humans*," "*Likely to Be Carcinogenic to Humans*," "*Suggestive Evidence of Carcinogenic Potential*," "*Inadequate Information to Assess Carcinogenic Potential*," and "*Not Likely to Be Carcinogenic to Humans.*" Previous USEPA guidance assigned weight-of-evidence classifications to potential carcinogens; constituents were classified as Group A, Group B1, Group B2, Group C, Group D, or Group E carcinogens. Weight-of-evidence classifications are presented in Tables 6.1 and 6.2, Appendix M."

20. ***Comment:*** Page 7-13. Section 7.4.1 Non-carcinogenic and Carcinogenic Risk Estimation Methods

    Editorial: The last sentence on this page reads, "If the HI for each target organ is not above 1, it can be assumed that there is no non-carcinogenic hazard to the receptor **above the USEPA's target level**" (emphasis added). We recommend deleting the last five words in the above sentence.

    Response: The suggested change will be made.

21. ***Comment:*** Page 7-14. Section 7.4.1 Non-carcinogenic and Carcinogenic Risk Estimation Methods

    The section on "Carcinogenic Risk Estimation" only shows the linear low dose cancer risk equation. Consistent with reference (f), the "*linear equation is valid*

only at low risk levels (i.e., below estimated risks of 0.01). For sites where chemical intakes might be high (i.e., risk above 0.01), an alternate calculation equation should be used. The one-hit equation, which is consistent with the linear low-dose model given above and described in the box on page 8-11, should be used instead."

We recommend that this section be updated to include the one-hit equation. Please also confirm that the correct equation was used to estimate the future lifetime resident risk from exposure to shallow groundwater, since the excess lifetime cancer risk (0.22) warrants the use of the one-hit model according to reference (f).

Response: The one-hit equation was used to estimate the ingestion risk associated with vinyl chloride – the only constituent/scenario with a cancer risk greater than 0.01. Section 7.4.1 will be updated to discuss the one-hit equation.

22. ***Comment:*** Page 7-15. Section 7.4.2 Risk Assessment Results, Future Adult Resident
Page 7-16. Section 7.4.2 Risk Assessment Results, Future Child Resident

The first sentence in both sections states that "*hazards **and risks***" were evaluated for these receptors and provides a reference to the specific tables that show these calculations (emphasis added). We recommend removing "and risk" from these statements since the text and corresponding tables only include the evaluation of noncarcinogenic hazards. The evaluation of carcinogenic risk was performed for a future lifetime resident and these calculations are shown on different tables.

Response: The suggested change will be made.

23. ***Comment: Page 7-20. Section 7.5.1 General Uncertainty in COPC Selection***
According to Table 2-7 in Appendix M, the detection limits for several VOCs are greater than the screening levels. This should be discussed in the uncertainty section since several compounds with detection limits greater than the screening values were not selected as COPCs.

Response: Uncertainties associated with reporting/detection limits above the screening levels will be addressed in Section 7.5.1 of the text.

24. ***Comment:*** Page 7-20. Section 7.5.2 Uncertainty Associated with Exposure Assessment

The second paragraph is this section discusses the unvalidated subsurface soil samples that were not included in the quantitative risk characterization since these samples had detections of CVOCs at fairly shallow depths (4.5 – 6.5 ft bgs). The last sentence concludes, "*This results in a potential underestimation of potential risks associated with exposure to subsurface soil, particularly for a future construction worker, and potentially, **although less likely** for a future industrial worker or resident*" (emphasis added).

The conclusion about potential risks to future industrial workers and residents does not seem to consider the vapor intrusion pathway, which wasn't

quantitatively or qualitatively evaluated in this risk assessment. Since the phrase "although less likely" could be open to debate, we recommend deleting those words from the above sentence.

Response: The suggested change will be made.

25. ***Comment:*** Page 7-20. Section 7.5.2 Uncertainty Associated with Exposure Assessment

    Page 7-23. Section 7.5.4 Uncertainty in Risk Characterization

    Consistent with General Comment #4, this baseline HHRA did not evaluate one of the potentially complete exposure pathways (vapor intrusion). We recommend that this be discussed in these sections of the uncertainty assessment so that it has been documented that the Navy understands the impact that this has on the quantitative risk evaluation.

    Response: See Response to Comment 4.

26. ***Comment:*** Page 7-21. Section 7.5.3 Uncertainty Associated with Toxicity Assessment

    Tables 5.1 and 5.2 in Appendix M includes a column with uncertainty associated with the non-carcinogenic toxicity values. Uncertainty factors are inherent to the development of toxicity values. Since these values are presented we recommend including a discussion in this section about the confidence in the toxicity values used to calculate risks.

    Response: This is generically discussed in the first paragraph of Section 7.5.3, indicating that the uncertainty factors applied to the toxicity values would most likely result in an over-estimation of the non-carcinogenic hazard.

27. ***Comment:*** Page 7-24. Section 7.6.2 Combined Surface and Subsurface Soil

    a. The first sentence on this page states, "*...and therefore the non-carcinogenic hazard is acceptable.*" This is a risk management conclusion and should not be included in the risk characterization section. Alternatively, results should be compared to benchmark levels to provide context. Additionally, since Section 5.1.5 states that DNAPL is likely present in subsurface soil, but the vapor intrusion pathway was not quantitatively evaluated, this conclusion may be premature. A possible updated version of this sentence could read, ""*...and therefore the non-carcinogenic hazard for the exposure pathways evaluated is below the USEPA's target HI of one.*"

    b. The first paragraph, next to last sentence, reads: "*There are no carcinogenic risks to the child resident based on exposure to combined surface and subsurface soil.*" We recommend deleting this sentence since the child resident was not evaluated separately for carcinogenic risk (the carcinogenic risk was evaluated for the combined adult/child resident).

    c. The last paragraph is this section discusses the unvalidated subsurface soil samples that were not included in the quantitative risk characterization. The last

sentence concludes, "*Based on the qualitative evaluation... and potentially, **although less likely** for a future industrial worker or resident...*" (emphasis added). The conclusion about potential risks to future industrial workers and residents does not consider the potential exposure and risk from the vapor intrusion pathway, which was not quantitatively or qualitatively evaluated in this risk assessment. Since the phrase "although less likely" could be open to debate, we recommend deleting those words from the above sentence.

Response: The suggested changes will be made.